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Technology and Strategy: A Study in the Professional Thought of the U.S. Navy, 1900-1916

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In the rather brief time between the Spanish American War and World War I, rapid technological change made its mark on the nature of naval warfare. It became incumbent upon dedicated naval professionals to harness new technology to strategy by developing new administrative structures, operational procedures, and doctrine, thereby striking a balance between the current state of the art and traditional goals and principles of naval warfare. A recurring problem confronts the military profession to this day, and the efforts of these men who learned to control the technological environment of their age should provide useful insights for those engaged with contemporary military planning.

TECHNOLOGY AND STRATEGY:

A STUDY IN THE PROFESSIONAL THOUGHT OF THE U.S. NAVY, 1900–1916

A research paper prepared

by

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Speaking before the 1912 Summer Conference at the U.S. Naval War College in Newport, R.I., Surgeon A.W. Dunbar, USN, concisely stated his understanding of naval warfare:

> With War came Strategy, primitive at first as Man, his nature, his needs and his weapons were primitive. As Man became more complex, War became more complicated and Strategy an Art necessary not only in War but, as Preparedness, also, in Peace. The prototype of the Navy, the solitary savage in his canoe, has developed into the modern Dreadnought with its intricate machinery of offense and defense, its thousand soul of diversified specialties, all of which to assure success must be instantly obedient to the mandate of a mastermind.[1]

While the speaker's imagery may have brought wry smiles to his audience, the thrust of his remarks touched upon a central issue in professional naval thought in the years between the Spanish American War and America's entry into World War I. The revolution in ship construction, ordnance, and engineering had begun more than half a century before, but the Navy, as a profession, did not immediately come to grips with the impact of the new technology as it related to the service as a whole. The question was much deeper than merely aiming weapons of greater destructive force or developing new tactics for armored steamships. In the years between 1900 and 1916, many

naval officers began to understand that the burgeoning technology profoundly affected such broad areas as command and control, personnel training, leadership, and morale, as well as the more obvious affairs of research and development, logistics, and tactics. Naval strategy became more than just the physical distribution of fleets; it became the art of comprehensively directing seaborne power. For those who practiced it, naval strategy involved an understanding of the capabilities and limitations of men and the machines with which they worked and lived.

In England during the last three decades of the 19th century, the Colomb brothers began to deal with the broad issue of what a navy should be designed to do. In 1874 John Knox Laughton proposed a "scientific" study of naval history for this purpose,[2] and in America, Rear Adm. Stephen B. Luce founded the Naval War College in 1884 for the systematic study of warfare. Around him Luce gathered a small, but promising, group of officers, including French Chadwick, Bradley Fiske, Albert Gleaves, Caspar Goodrich, William McCarty Little, Alfred Thayer Mahan, William L. Rodgers, William S. Sims, Yates Stirling, and Henry C. Taylor. In addition to naval officers, he drew J.R. Soley, New York lawyer and Naval Academy professor, the Army's Tasker Bliss, and Theodore Roosevelt. Those who gathered at Newport in the 1880's and 1890's made up a unique and relatively unknown group of intellectuals and visionaries whose views were not widely shared in the naval service or in the Nation.[3] By the end of the Spanish American War, one of the officers, Captain Mahan, had achieved international renown. In a series of 10 books published between 1890 and 1900, Mahan elaborated upon the concept of seapower as a basis for national policy. Using historical examples, he awakened a broad audience to the general purposes and capabilities of naval power in its broadest context. Within the service, Luce, Mahan and their disciples at the Naval War College sought to view the broad scope of the profession and avoid the narrow outlook of a technicist. As a spokesman among these men, Mahan focused professional thought on the basic purpose and nature of a naval force. Unlike Great Britain's Sir Julian Corbett, he did not work out a carefully structured philosophic statement of maritime strategy. However, Mahan provided an intellectual focus and created a receptive audience for the men who developed and exercised strategic control on the sea.

As the most prominent student of naval power in America, Mahan is particularly important in relation to the naval developments of his time. The reader of his works is struck by the fact that in an age of dramatic technological change Mahan could seemingly ignore the complex problems of ordnance, engineering, and communication, all of which absorbed his fellow officers. Of course, this was the point of the matter. As he wrote in the "Introductory" to *The Influence of Sea Power Upon History 1660-1783*,

> It is not therefore a vain expectation, as many think, to look for useful lessons in the history of sailing-ships as well as in that of galleys. Both have their points of resemblance to the modern ship; both have also points of essential difference, which make it impossible to cite their experiences or modes of action as tactical *precedents* to be followed. But a precedent is different from and less valuable than a principle. The former may be originally faulty, or may cease to apply through change of circumstances; the latter has its root in the essential nature of things, . . . Conditions and weapons change; but to cope with the one or successfully wield the others, respect must be had to

> these constant teachings of history in the tactics of the battlefield, or in those wider operations of war which are comprised under the name of strategy.[4]

Acknowledging that rapid developments in technology have vastly increased the scope and rapidity of naval operations, Mahan believed that no matter what equipment was employed in fighting wars at sea, certain basic principles remained changeless over the ages. These included the function and objectives of a navy in war, the establishment of supply depots and the maintenance of communication between advanced depots and home bases, the value of commerce destruction as a secondary or even decisive role in warfare, and the relative merit of controlling vital positions through which all traffic must pass as opposed to carrying out scattered raids along other routes.[5] In Mahan's mind, changing technologies in different areas canceled one another out and left only basic issues with which naval men in any time period must deal. Warfare is more an art than a science, and the principles and abstract general maxims which Mahan developed were not mathematical formulae invariably applied as "rules of war." As an "art," the principles of warfare, no matter how sound and generally held, are always subject to qualification when applied in specific situations. As Mahan himself noted in a lecture at the Naval War College,

> I must allude to the vast variety of motives, conditions of its age or surroundings which impel Art to its creation. For War these are found reproduced in the variety and changes of weapons from age to age, in the varying character of regions which are the scenes of war, in the temper and organization of the armies . . .[6]

Capt. William McCarty Little expressed the same concept to War College students when he bluntly told them "a principle applies when it applies and it don't apply when it don't apply."[7] Both men were underscoring the point that abstract strategic or tactical principles cannot be applied realistically. It is only in the spirit of the principles that a basic understanding could be extracted and used as a sure guide to the exercise of judgment.

In the formulation and exercise of naval strategy, technological knowledge was an essential requirement. An understanding of the tools employed was as important to the tactician engrossed in their use as it was to the strategist concerned primarily with goals and principles. McCarty Little expressed the close relationship between tactics and strategy when he noted,

> . . . a fight without a mission, is action without purpose, muscle without brain. And this suggests what to some may seem a somewhat novel view of the difference between strategy and tactics, that is, the "inner" or fundamental distinction: Strategy, war from the point of view of the one who has an object to attain, i.e. the planner; and tactics, war from the point of view of the executor; or something like the distinction between architect and the builder, the playwright and the actor.
>
> While the distinction between strategy and tactics is clear, yet when it comes down the line between the two, we find that they encroach somewhat upon each other's domain, each tending to overlap. This alone is sufficient to show that their movement of approach is from opposite sides. Strategy is the thought seeking its means of execution, and tactics is the means to carry out the desires of the thought.[8]

To Little's way of thinking, tactics was the servant of strategy. No tactical problem had meaning without a strategic setting, and no strategy could

develop auspiciously without reference to tactics.

The creation of an effective organization within the U.S. Navy for implementing such ideas was slow. Up to the 1880's no centralized planning or coordinating activity existed, beyond the Office of the Secretary of the Navy. The Chiefs of Bureaus under the Secretary tended to quarrel rather than cooperate, for they were characteristically more interested in their specialties than in efficient, central direction during wartime. The temporary changes in organization instituted by Secretary Gideon Welles and Assistant Secretary Gustavus Fox during the Civil War were quickly dropped at the end of that conflict. Not until the 1880's was a successful attempt made to coordinate the activities of the Bureau Chiefs. In 1882 the Office of Naval Intelligence was established under the Bureau of Navigation and charged with the mission of gathering information in peace and war. Seven years later the Bureau of Navigation was given the additional responsibility of supervising the fleet.[9] This increasing awareness of the need for planning and coordination coincided with the establishment of the Naval War College and Admiral Luce's desire to "*raise naval warfare from the empirical stage to the dignity of a naval science.*"[10] Under Capt. Henry C. Taylor, President of the War College from 1893 to 1896, studies were made of the German General Staff whose strategic planning had brought about the defeat of France in 1870. The resulting recommendations to combine the functions of intelligence gathering, war planning, and general staff duties into a single coordinating body met with little support in Washington. Prior to the Spanish American War no effective coordinating body or war planning activity existed. In 1891 Mahan prepared "plans of operations in case of war with Great Britain" in conjunction with Secretary of the Navy Benjamin Tracy's "secret strategy board."[11] Five years later, Lt. William W. Kimball in the Office of Naval Intelligence prepared a general war plan for war against Spain.[12] While this plan reflected Mahan's theories on blockades, securing supply routes, and even foreshadowed Admiral Dewey's victory at Manila, neither Kimball's nor Mahan's plan was effectively backed by a doctrine of implementation. Both plans are interesting examples of the earliest attempts to apply theory to practice.

On 13 March 1900, Secretary of the Navy John D. Long established the General Board of the Navy. Conceived by Rear Adm. Henry C. Taylor as an organization which would eventually evolve into a general staff of the German type, the Board consisted of the Admiral of the Navy who acted as President of the General Board, the Chief of the Bureau of Navigation, the Chief Intelligence Officer and his principal assistant, the President of the Naval War College and his principal assistant, and three other officers above the grade of lieutenant commander. The Board's purpose was to "ensure the efficient preparation of the fleet in case of war and for the naval defense of the coast."[13] Specifically, Secretary Long wrote Admiral of the Navy George Dewey, the General Board was to devise plans which would employ U.S. naval forces to the best advantage, to organize in peace a proper defense for the coast, including the effective use of the Naval Reserve and merchant marine, and to develop an effective cooperation with the Army. The development of detailed war plans, the selection of base sites, and the observation of foreign naval activities in relation to American planning and capabilities were among the important functions of the new Board.[14] Henry Taylor's death in 1904 marked the end of the evolutionary attempt to develop the Board into a more authoritative organ with its own executive power and authority.

After 1904 the reformers within the

Navy advocated more strongly the creation of a full-fledged general staff. Some, discouraged by Admiral Dewey's disinterest in the cause, advocated the disestablishment of the General Board and even the abolishing of the position of Secretary of the Navy in favor of a more militant organization.[15] In 1909, following the recommendation of the Moody Board, Secretary of the Navy George von Lengerke Meyer reformed the Navy Department. Impressed with Theodore Roosevelt's criticism of Navy organization during the last few days of his administration, the new Navy Secretary in the Taft administration carefully studied the recommendations of his predecessors. Gathering together a variety of reports and documents, including the report of the Moody-Dayton-Mahan Board, Meyer submitted the problem of reorganization to a board headed by Rear Adm. William Swift. The Swift Board reaffirmed the principles of the Moody Board. On 1 December 1909, just 9 months after he had taken office, Secretary Meyer acted without congressional legislation and established an organization which ensured a continuity of policy while maintaining firm civilian control backed by responsible, professional advisers. In the new organization four divisions were created under the Secretary, each headed by a flag officer who held the title "Aid." The Aids for Personnel, Material, and Inspections consulted and advised the Secretary on matters of their departments. The Aid for Operations was the senior officer and the principal adviser to the Secretary. Although the Aids had no executive power of their own, their task was to coordinate Bureau responsibilities, give professional advice directly to the Secretary, and transmit and interpret his orders to Bureau Chiefs. The first Aid for Operations, Rear Adm. Richard Wainwright, was charged with coordinating the activities of the Naval War College, the Office of Naval Intelligence, and the General Board. With the Aid for Material, he served as an *ex officio* member of the General Board and functioned as executive head under Admiral Dewey. In 1915 and 1916 the position of Aid for Operations was strengthened with executive power by congressional authority, given four star status, and the new title Chief of Naval Operations. This placed the new position clearly above the fleet commanders and second in rank to the Admiral of the Navy. With Dewey's death in 1917, the CNO became the ranking officer in the Navy. The congressional act authorizing these increased powers specifically provided that orders issued by the Chief of Naval Operations would have the full force and effect of orders emanating directly from the Secretary of the Navy. Throughout this period the General Board continued to provide guidance in war plans and recommendations for the growth of the American Fleet. With the assistance of the Naval War College, the General Board was capable of broad reflection on the purposes, capabilities, and disposition of the U.S. Navy.[16]

At the Naval War College significant patterns developed which paralleled the developments in naval organization in the Navy Department. In addition to the well-known reforming leadership taken by Admirals Luce and Taylor, complementing the publicist activities and theories of Alfred Thayer Mahan, there were two additional factors: war gaming and the development of a philosophy for the military planning process.

In 1886 a medically disabled Navy lieutenant, William McCarty Little, living in Newport, R.I., delivered a lecture to the War College students advocating the implementation of Sir Philip Colomb's concept of a naval war game which had been introduced into the Royal Navy in 1878. Neither Colomb nor Little were originators of the naval war gaming concept. In 1790 the Scottish merchant and etcher, John

Clerk of Eldin, had publicly issued his famous work *An Essay on Naval Tactics.* In developing what became the standard text for tacticians in both the United States and Great Britain, Clerk reported that he had used small ship models which he constantly carried in his pocket, "every table furnishing sea-room" for his experiments. War games had been used much more extensively in the Army. Both the British and American Armies had been influenced by the German *Kriegspiele.* In 1879 Maj. W.R. Livermore had written the first American work on war gaming. The following year Lt. C.A.L. Totten devised a series of war games for National Guardsmen. At Newport, McCarty Little, a permanent member of the War College staff, perfected his system of naval war gaming. Under the Presidency of Henry Taylor, the games became a regular part of the War College curriculum in 1894. As devised by Little, the war game became a valuable analytical tool which could readily be used by all ranks and could be made to represent any type of fleet or naval force. While its limitations were apparent, the naval war game was an attempt by which theories of warfare could be tested within the context of a contemporary and changing technology.[17]

At the end of the first decade of the 20th century, the Naval War College borrowed another concept from the Army. In November 1907 a former staff member from the Naval War College, Comdr. W.L. Rodgers, was sent to study at the Army War College. Remaining there until mid-December 1909, Rodgers joined Army officers in learning the principles of warfare through the "applicatory system." This method of teaching was based on the idea that military principles were best learned by their application, rather than by the abstract study of the principles alone. "Map maneuvers," war games in the tradition of the *Kriegspiele,* were used in conjunction with "rides" in which historical, tactical, strategic, and staff problems were solved on the actual terrain of the countryside. In the "rides," the troops were imaginary, but by using the physical contours of the land around them, students learned the relationship between the map and the terrain, a planning tool and an environment.[18]

The applicatory system consisted of three major parts: the estimate of the situation, the writing of orders, and the evaluation of the plan through war gaming or exercises. The "estimate" concept provided a structure through which a strategic problem could be analytically viewed. It considered first the mission of an operation, the position and strength of both sides, and from that basis developed a plan of action. A second step, writing orders to carry out the plan of action, inspired the establishment of a doctrine by which orders could be effectively passed from one level of command to another. By creating a philosophy of the order form, nonessential details could be eliminated from the orders of those concerned with broad strategic issues. This would allow for a maximum of tactical initiative. In effect, this way of thinking challenged the traditional demand for complete and absolute obedience from subordinates. The new philosophy of the order form recognized the impracticality and inefficiency in attempting to control large and complex forces directly from headquarters. The doctrine which evolved gave subordinate officers responsibility and encourage them, as rational and capable men, to further the intentions of their superiors.[19] As Col. G.F.R. Henderson put it in his 1905 work *The Science of War:*

> . . . no order was to be blindly obeyed unless the superior who issued it was actually present, and therefore cognizant of the situation at the Time that it was received. If this was not the case, the recipient was to use his own

> judgement, and act as he believed his superior would have directed him to do had he been aware of how matters stood . . .[20]

The basic ideas of the applicatory system came directly from the German General Staff. The U.S. Army had begun to study many of these methods at an early date and had begun to adopt them for American use. In 1906 Maj. Eban Swift published his *Field Orders, Messages and Reports,* and in the same year, Maj. C.H. Barth published his translation of General Griepenkerl's *Letters on Applied Tactics.* In 1909 Capt. Roger S. Fitch wrote *Estimating Tactical Situations and Composing Orders.*[21] These three items in particular had a great impact on the Naval War College and were often cited as sources in lectures and studies by naval officers. While W.L. Rodgers was at the Army War College carefully studying Army methods and envisioning their application to war at sea, Barth's translation of Griepenkerl came to the attention of a Marine Corps officer studying at the Naval War College, Maj. J.H. Russell. Russell brought the volume to the attention of William McCarty Little in the fall of 1909.[22] At the same time, visiting students from the Army War College undoubtedly brought many of the new ideas with them to Newport. An applicatory system shortly became a topic of interest among both the students and staff in Newport. At the Summer Conference in 1910 Comdr. Frank Marble gave the Naval War College's first lecture on the "Estimate of the Situation." In the lecture he followed closely the ideas of Griepenkerl and cited Eban Swift as an authority. The following summer Comdr. C.T. Vogelgesang expanded Marble's study. In November 1911 W.L. Rodgers returned to the Naval War College as its new president. In the interim since his detachment from the Army War College he had been promoted to captain and completed a tour of duty in command of the battleship *Georgia.* With his return, Naval War College curricula were changed. The course of study was reformed to include the new ideas adapted from the Army. The "estimate of the situation," the "order form," and war gaming all intermeshed in a new direction for the Navy. As one contemporary noted, "a great white light broke on the service, especially in 1912 when the War College first laid emphasis upon the importance of doctrine."[23]

Shortly after the innovation of these new concepts at the Naval War College, dramatic change was seen in the war plans produced by the General Board. Previously war plans had consisted of charts and collated data on specific areas of strategic importance. In 1904 Army Chief of Staff Lt. Gen. A.R. Chaffee proposed to the Joint Board that the Army's General Staff and the Navy's General Board prepare a series of war plans for joint use. From this proposal developed the "color plans": *Blue* indicated the United States, while *Orange* meant Japan; *Black,* Germany; *Green,* Mexico; *Red,* Great Britain; *Indigo,* occupation of Iceland; *Tan,* intervention in Cuba; *Violet,* intervention in China, *Grey,* occupation of the Azores; *Brown,* maintenance of internal security in the Philippines, et cetera.

For the most part these plans were little more than abstract exercises and had little relation to actual events.[24] However, both the Orange plan for war with Japan and Black plan for war with Germany were frequently revised and kept up to date with the international scene. By 1913 the basic principles of this type of planning were well understood in both the Army and Navy. The revised versions of the Orange and Black plans increasingly reflected the concepts of the "estimate of the situation," and the "order form." At both war colleges, war gaming had become more important as a testing device for these national strategic plans, as well as remaining an educational tool for officers.

Understanding a problem within its own context and in relation to other influences affecting it is not a concept unique to the "systems analysts" of the 1960's and 1970's. The idea is old in military and naval affairs. In 1916 Bradley Fiske wrote that

> . . . a machine is in its essence an aggregation of many parts, so related to each other and to some external influence, that the parts can be made to operate together to attain some desired end or object. From this point of view, which the author believes to be correct, a baseball team is a machine, so is a political party, so is any organization.[25]

The work of strategy in the Navy, the problem of all encompassing direction, was threefold: to design the "machine," to prepare it for war, and to direct its operations in battle. An account must be taken of all aspects of the problem from the outset.[26]

> . . . we must admit that as surely as the mind and brain and nerves and the material elements of man must be designed and made to work in harmony together, so surely must all the parts of any ship, and all the parts of any Navy, parts of material and parts of personnel, be designed and made to work in harmony together; obedient to the controlling mind, and sympathetically indoctrinated with the wish and the will to do as that mind desires.[27]

Such a notion was not unique to Fiske. In 1913 McCarty Little had even used the same imagery when he discussed the philosophy of the order form before the Summer Conference at the Naval War College. "We have noted that the order form was a complete plan of action. The different agencies are the different parts of a machine, and for the machine to work satisfactorily, every piece must do its part. Solidarity is the essential quality."[28] Lt. Comdr. Dudley W. Knox expressed a similar idea,

> Both ashore and afloat we, therefore, imperatively need first of all a conception of war. Once this is created we will be enabled to proceed, with our eyes open and our course well marked, towards a coherent comprehensive scheme of naval life. Doctrine methods and rules may be made to flow consistently and logically therefrom. Strategy, tactics, logistics, gunnery, ship design, ship exercises, shore and ship organization and administration—every ramification of the profession—may be developed with confidence and wisdom, and harmoniously interwoven to produce, not merely the present heterogeneous body with a few efficient parts, but exclusively efficient parts well knit into a competent and homogeneous body.[29]

While an overall conception of naval warfare was recognized as essential to understanding its basic problems, some observers pointed out that the concept and the means could not be separated. Speaking before a Naval War College audience on the subject of the Orange War Plan, Capt. W.R. Shoemaker remarked,

> . . . it has been said that in a strategic problem having once determined what you *want* to do, the rest is a matter of arithmetic. Rather it is the other way 'round. It appears more logical to ascertain first the resources that are available; and then use arithmetic to determine what surely can be done.[30]

These two approaches to war planning were reflected in a criticism of the Black Plan made by a staff officer in the Navy Department. In an undated memorandum signed only "McK." the officer protested that "this is not a *Plan* but an 'Estimate of the Situation' upon which

a Plan would be based. A preliminary study leading to a decision but not a *Plan* to carry out a decision." Specifying precisely what he had in mind, "McK." wrote,

> A War *Plan* should be complete in details, with all officers, vessels, men, yards, blueprints, bill of material, quantities of fuel, clothing, stores, *etc.*, etc., mentioned *by name*—given in lbs., tons, etc.; all questions of time, etc., definitely faced. Everything *complete* so that detailed telegraphic orders can be prepared ready to put on the wires on the receipt of the order—"Mobilize."[31]

The dichotomy between those who claimed precedence for the overall concept and those who stressed the technical capabilities of the available resources was recognized early. Comdr. C.T. Vogelgesang, in the earliest expositions of the "estimate of the situation" in its navy context, warned that the two points of view were complementary, not opposing.

> Now, war is war; and whether we choose to study it as Army or Navy men, it is still the same subject: only handled with different tools.
>
> We cannot learn how properly to use those tools until we know something of the Art we are going to practice with them. Knowing the Art is common ground for us all, knowing our tools is our especial science; but each with his own tools may become better able to apply them to the tasks cooperatively, if each is well grounded in this knowledge of the Art.[32]

The blending of "Art" and "Science" in war planning may be seen in a variety of ways. The work of historians such as Mahan and Corbett had its own special place. The impact of their writings was more than esoteric, for it had its direct influence too. The 1911 Orange Plan, for instance, contains a discussion of the possibility of a Japanese invasion of the American mainland. To support their contention that such an invasion would obviously be doomed to failure, the strategists cited "an established military maxim, that it is the weaker form of war to project the campaign into the theater where your enemy is strongest." A full understanding of military power "would seem to brand the conception [of invasion] as too fantastic to be seriously contemplated by Orange." The writers of the Orange Plan felt that it was an historian, Julian Corbett, who in his *England and the Seven Years War* had stated the principle most adequately, and it was to him that they turned as an authority on this point.[33]

The degree to which the strategist was also believed to be a technician is difficult to gauge. As many naval leaders pointed out,[34] the typical naval officer, totally involved in the technical details of his profession, failed to see the broader issues. The opposite was also true; the strategists could not forget the tools which would be used. In lectures at the Naval War College, Mahan noted:

> War is a tremendous game of skill and chance combined. The artist, to recur to my definition, may form the noblest conception, his skill may be of the highest order, and the refractory and uncertain character of his materials may defy all his efforts, a chance slip of his instrument may destroy the work of months.[35]
>
> The painter and the sculptor, likewise in realizing their conceptions, must submit to the conditions—to often, alas, the limitations—imposed by the materials with which they work. These are the same for the veriest dauber as they are for a Raphael; they are stamped and branded by that stolid immutability of which

Science boasts in the realm of Nature.[36]

In the period between 1900 and 1916, the Navy advanced dramatically in technology. "The most obvious thing about a Navy," wrote Fiske, "is its material: the ponderous battleship, the picturesque destroyers, the submarines, the intricate engines of multifarious types, the signal flags, the torpedo that costs $8,000, the gun that can sink a ship 10 miles away."[37] It was these things which had caught the public eye and had engrossed the attention of naval men. Much of the organizational, administrative, and personnel changes in the period were related to the problem of controlling and utilizing this new equipment.

In 1906 the appearance of H.M.S. *Dreadnought* relegated all previous battleships to a secondary position. As an archetype of later battleships, the new British ship had a main battery twice as powerful as any other ship in the world. During trials, her turbine engines steamed 7,000 miles at an average of 17½ knots and sustained a maximum speed of 21.6 knots, far better than the performance of the ordinary reciprocating engines found in other navies. *Dreadnought* featured a number of epochal innovations which were soon imitated by navies around the world.[38] While the battleship became the most well known and most controversial innovation in the period, it was certainly not the only event. Britain and Germany developed the battle cruiser, high-speed, heavy gunned ships which could outrun battleships and outgun conventional cruisers. Destroyers evolved from the light torpedo boats of the 1880's and 1890's. Pioneered by the Germans, they maintained their original function for torpedo attacks, but other armament was added. The destroyer shortly became an important part of the fleet as an adjunct to the scouting line and a protection for capital ships.

Within the U.S. Navy technological events moved rapidly to keep apace with foreign developments, and the Nation's reputation gained in 1898 as a naval power to be reckoned with. The Navy's first submarine *Holland* was acquired in 1900 and soon followed by five more, slightly larger boats. By 1914 there were 49 submarines in the U.S. Fleet. The gasoline engine originally designed for the *Holland* boats was replaced with the German diesel engine developed in 1909. At about the same time, a perfected gyrocompass made possible sustained underwater navigation and more accurate torpedoes.

In 1910 and 1911 Eugene Ely made successful landings and takeoffs from improvised flight decks on Navy ships. Also in 1911, Glenn Curtis developed and built the first seaplane. The following year Lt. T.G. Ellyson flew a plane launched from a compressed air catapult, and Rear Admiral Fiske patented the first design for a torpedo plane. In 1913 the first scouting flight by an airplane in a fleet exercise was made by Lt. J.H. Towers, and in 1914, aircraft were actually used by the Navy for scouting and spotting in combat at Vera Cruz, Mexico.[39]

In ordnance, naval guns grew from the 13- and 8-inch guns of *Kearsarge* and *Kentucky* to the plans for *Maryland's* 16-inch 45-caliber guns. Fleet target practice was innovated on the Asiatic station in 1902, and significant procedural changes were made in fire control. Armor piercing projectiles, improved propellants, and "carbonized" armor were introduced and widely used.[40]

Other important events occurred in the area of communications. In 1900 the first official radio message from a U.S. naval vessel was transmitted from U.S.S. *New York*. By 1904, 24 Navy ships had been equipped with radio, and 19 naval radio stations were established ashore. In May 1916 the Commanding Officer of *New Hampshire*, at sea off the Virginia Capes, held a two-way

conversation with the Secretary of the Navy in Washington and the Commandant of the Mare Island Naval Ship Yard in Calif., using both radio and landlines. Later in the same year, a chain of high-powered naval radio stations was completed with the commissioning of the station at Cavite, Philippine Islands.[41]

In other areas the scope of the new naval technology ranged from water tube boilers, liquid oil fuel, electric logs, research into a cure for tuberculosis in naval hospitals, and a new compass card divided by degrees as well as points to the feat of towing the floating drydock *Dewey* 13,089 miles from the east coast to Olongapo, Philippine Islands.

While the Navy's technology was its most obvious aspect, the ramifications of the new inventions went deeper than many observers suspected.

The technical considerations with which strategists became concerned involved nearly every aspect of naval life. At the establishment of the General Board in 1900, Henry Taylor had carefully pointed out to Secretary Long and Admiral Dewey the dangers of becoming too engrossed in technical problems.[42] Yet, as other commentators have noted, technical considerations were necessary for the success of the broadest strategic outlook.

One of the earliest problems strategists faced in relating to the efficiency of the fleet was the state and readiness of the ships. In a 1909 letter to the Secretary of the Navy recommending increased pier services for ships, George Dewey wrote,

> The value of a ship of war as part of the sea power of a nation separates itself naturally into two parts: first and most important, the number of years she renders in commission, either at sea or ready to move; second, the number of years or months during which she is in ordinary or under repairs, when her influence and value are dependent upon the time necessary to deliver her in commission, with a trained and efficient personnel, able to take her proper place in the fleet . . . Yet be admitted that the amount of service in commission ready for sea is a fair measure of the value of ships, then any means of increasing that service deserves consideration.[43]

In the early years of the century, the General Board's study on increasing the value of ships centered around support problems such as pier services, coaling capacity, and speed of coal delivery.[44] Studies were made on a ship's speed and turning radius as a strategic rather than a tactical problem. In this context, speed was regarded as a key to the concentration of gunfire and centralization of command.[45]

In 1909 Dewey protested to the Secretary that a balance between designers and users had not been achieved. "The General Board believes it to be its duty," Dewey wrote, "to invite the Department's attention to the fact that there is not . . . anything that insures reference of the details of military features as they are developed in the elaboration of the designs and in the building of the ships to seagoing officers for their comment and recommendations." In order to ensure that all fleet ships were well built, Dewey recommended that details affecting the military nature and operational capability of a Navy ship be submitted to a board of experienced men for review. Dewey was especially concerned with the development of ordnance, fire control, armor, torpedo installations, ammunition stowage, and anything else which affected the command and control of the ship such as steering gear, compartmentation, accesses, interior communication, coaling plans, ash handling, and small boat stowage.[46]

In 1916 Naval Constructor R.D. Gatewood wrote that he detected a change in the relative importance of the

factors involved in war, a change not entirely realized by those vitally concerned with the problem. "Formerly, it was largely a question of generalship, or numbers and morale of troops, that determined victory," he wrote. "Now surely it is no disparagement to the skill of the strategist, to the vigilance of the tactician, or to the valor of the soldier in the ranks, to say that victory will rest with that side which can maintain the combat most vigorously and for the longest time."[47] While Gatewood's opinions might not have met with total professional agreement among those who advocated moral courage as the determining factor in war, few would deny that the problem of logistics was crucial to the issue. The opening paragraph of the Orange Plan's "Strategic Section" expressed the General Board's concern and understanding for the logistics problem.

> The logical development of the strategy of war with Orange demonstrates how absolutely all operations depend upon the logistics of the war—the exacting, ever present questions of equipment, supply and communications. No strategic study, in fact, is possible until it is definitely known or can be assumed, what are the means provided to initiate the war and how complete the arrangements are to transfer the fleets and flotillas to the area of operations and then adequately to support them there against the assumed power and dispositions of the enemy. If the means are lacking to insure the arrival of the full naval strength of a country in the area where the decisive battles of the war must be fought, and to keep it adequately supplied in that area, it is as over powering a national calamity as a decided inferiority in the equality of the personnel and in the number and character of fighting ships.[48]

In lectures to the students at the Naval War College, Commander Vogelgesang attempted to impress upon his audience the practical importance of this aspect of warfare. Logistics, he noted, has no direct relationship to tactics, but it is the dynamic force behind strategy. He felt that it was somewhat trite even to point out that "Material is soulless; it cannot be pushed to an endurance beyond that which the mind of man designs for it." Yet, Vogelgesang really wondered if naval men fully realized the obvious. Is the Navy "prepared to say that the *being able to* is harmonized with the wishing . . . ?"[49] The most artful strategy, supported by the highest order of valor and courage, but lacking a sound logistic understanding, "is only a phantom that lures *disaster, defeat,* and *disgrace.*"[50]

Gatewood noted that new, modern warfare had developed into a national, industrial undertaking rather than an undertaking of a specialized group of military experts. Warfare in the new era would involve the organization of every detail and draw upon every resource in the nation.[51] Much of this organization would be the logistics of preparedness, but preparedness for war, the ability to mobilize a great deal of equipment quickly and support it, is crucial to survival.[52] The nation which has used peacetime to equip her fleet and insure its readiness as an offensive weapon at the outbreak of war has added materially to its chances for success, particularly if the enemy has been negligent. In relation to war with Germany, the strategists saw that the Atlantic Ocean did not give safety, but only allowed a few days grace for the existing equipment of war to be used in delivering a blow. "Blue and Black are separated by about ten days for a modern fleet," the General Board noted. "Therefore, if either country is more than ten days behind the other in war mobilization, that country is heavily handicapped at the outset."[53] The

planners also felt that if either country possessed radically different war resources or equipments, and at the same time was capable of mobilizing a much stronger fleet, the weaker nation should include in its peacetime preparedness plans a first-strike capability to overcome the disadvantage. This would ensure "the delivery of the first blow, and then a succession of blows."[54]

Having a carefully balanced fleet largely depended on a strategic understanding of a potential enemy's equipment and capabilities. While navalists and their associates directed their interests to the international battleship building rivalry, the strategists who planned for war knew very well the need of a strong and coherent naval force. Paymaster General T.J. Cowie noted that

> . . . the auxiliaries of a fleet can truly be said to be as necessary to the battleship and cruisers, as Logistics is essential to Strategy. Embracing as they do, the colliers, fuel ships, transports, despatch boats, scouts, aeroplanes, etc. they represent the arteries that furnish and renew the speed and battling power of the fighting ship.[55]

In 1910 Admiral Dewey wrote the Secretary of the Navy that America's international commitments, her obligation to uphold the policies of the Monroe Doctrine, the Open Door, and the neutrality of the Panama Canal required an efficient and balanced fighting fleet with "fighting adjuncts" as well as auxiliaries. "The battleship fleet without its destroyers, repair ships, scouts, transports, supply ships, colliers, hospital ships, etc. is not complete, for it cannot keep the sea continuously unless it carries its base with it and is accompanied by the train necessary for this purpose."[56] Strategists, in the eyes of the General Board, needed to understand the use and function of each type of ship and how these complemented one another. They needed to visualize the actual operational requirements of each type and to comprehend the technical basis of employment and support.

With any growing technology, the problem of invention, research, and development would naturally arise as a related function. However, in an international situation in which technology is an object of competition among different powers, the development of new machines becomes an area of prime concern. In 1901 the Commander in Chief of the British Mediterranean Fleet, Sir John Fisher, noted that the design of fighting ships *must follow the mode of fighting instead of fighting being subsidiary to and dependent on the design of the ship.*"[57] In other words, Fisher believed that the technology of ship design must be attuned to and directed by military requirements. In the U.S. Navy the organization of the service was not yet adequate to handle this sort of direction. The General Board, as we have seen, recommended as late as 1909 that the details of ship design be submitted to a board of officers for precisely this reason. Research and development from a strategic point of view began rather slowly. In 1903 the General Board discovered that no satisfactory method had been devised for transporting guns from a shore debarkation point to their mountings in undeveloped areas. The Board's only recourse was to request that the Bureau of Ordnance be "invited" to investigate the problem and have the Marine Battalion in Annapolis make a practical test of prototype equipment.[58] A few months later the General Board reviewed the problem of obtaining proper optical glass for telescopic gunsights. Dewey lamented to the Secretary,

> One of the serious difficulties in this matter is the lack of expert knowledge on the part of instrument makers in this country; the best of them being very hazy as to

> the actual power of telescopes which they supply. Quite recently a large contractor in buying a lot of telescopes for special purposes received one of them having a power of 4½ diameters when the contract called for 8, and the maker, one of our best opticians, seemed entirely unable to understand the criticism or to locate the cause of failure. It seems a fact that we must go to Berlin for expert opinions about this topic.[59]

Under such conditions the American Navy was in no position to have a research and development program which would be guided by the modes of warfare. The situation was much the same in 1908 when Comdr. A.L. Key, a former naval aide to President Theodore Roosevelt, reported to take command of the cruiser *Salem* at Boston. Visiting the nearby Fore River Shipbuilding Co. at Quincy, Key reviewed the construction progress of the battleship *North Dakota*. Horrified by the design defects, he wrote the Secretary of the Navy, pointing out the flaws he observed and recommending specific changes. At the instigation of the President's naval aide, Comdr. W.S. Sims, President Roosevelt directed the Secretary of the Navy to convene an investigating committee composed of the General Board and the students and staff of the Naval War College to consider Commander Key's remarks. The final report of the "Battleship Conference" covered many problems. Two of the subcommittees specifically noted in their deliberations that American designs should never be allowed to fall behind the progress of other nations.[60] Among all the comments it was only the one made by the President of the Naval War College, Rear Adm. Caspar Goodrich, that expressed his disappointment in the U.S. Navy's record in making an original contribution to battleship design:

> The evidences are unmistakable of the manner in which this design was reached. Its object is as plain as a pike-staff—to be just a little better than some particular foreign design—to see John Bull, for example, and go him one better. This is the method which has been the curse and bane of our naval ship building program for the past twenty-five years—a clog that has hampered us at every step.
>
> What an opportunity has been lost to our Navy! Had those to whom was commited the planning of this great ship cut adrift from this vicious practice of imitation and treated the subject in a logical way . . . , the voice of criticism would never have been raised. . . . On the contrary, they preferred to ignore the plain teachings of naval history, they built along narrow and preconceived lines, they failed to deal with their task in a broad and enlightened manner.[61]

In 1907 Bradley Fiske wrote in the Naval Institute *Proceedings* that the Navy's "ultra-conservatism" retarded the adoption of new mechanisms. Much of his discontent arose from the fact that many of his own inventions had not been accepted by the service. His dissatisfaction, though, was not unique. W.S. Sims had experienced much of the same difficulty in the U.S. Navy, as had Sir Percy Scott in the Royal Navy. Fiske's remedy was to establish an "experimental department" which would have the duty of improving old appliances, inventing new ones, and examining the schemes of others. He pointed out that such an organization had been used successfully by large business corporations. Such a department, as Fiske conceived it, would be a function of a general staff that directed the Navy as a whole and guided the various components of the service.[62] As the Secretary of the Navy's Aid for

Operations, Fiske several times urged that a board of invention and development be implemented.

The establishment of the Naval Consulting Board to perform these tasks was realized shortly after Fiske's resignation.[63] On 7 July 1915, Secretary of the Navy Josephus Daniels wrote to Thomas Edison asking that he head the new board whose first duty would be to consider countermeasures for that "new and terrible engine of warfare," the submarine. "One of the imperative needs of the Navy in my judgment," Daniels wrote,

> is machinery and facilities for utilizing the natural inventive genius of Americans to meet the new conditions of warfare as shown abroad . . . With a department composed of the keenest and most inventive minds that we can gather together, and with your own wonderful brain to aid us, the United States will be able to meet this new danger with new devices that will assure peace to our country by their effectiveness.[64]

To an enthusiast such as Fiske, the application of new mechanisms was the Navy's greatest glory. Writing in retirement at the Naval War College in 1916, Fiske exulted,

> Every advance of civilization will advance the Navy. Every new discovery and invention will directly or indirectly serve it. The Navy more than any other thing, will give opportunity for mechanisms and to mechanism. Far beyond any possible imagination of today, it will become the highest expression of the Genius of Mechanism and the embodiment of its spirit.[65]

Not all naval thinkers were willing wholeheartedly to accept Fiske's implicit assumption that technology *per se* was the ultimate measure of a navy. A controversial individual to begin with, Fiske's penetrating and often unorthodox observations were not always readily accepted. However, as Aid for Operations (1913-15) and President of the Naval Institute (1911-1923), his ideas were widely circulated and debated.

Some members of the General Board believed that naval technology should not be measured in absolute terms, but rather in terms relative to other nations. In a confidential memorandum adopted by the Executive Committee of the General Board on 6 August 1915, it was concluded that "the phenomenal and unprecedented progress in naval development made by other powers, therefore, subordinates consideration of the ultimate strength of the United States fleet as recommended by the General Board to that of relative strength." The committee felt that this conclusion was clearly illustrated by the fact that Germany's great merchant marine and powerful navy had been driven from the seas because it was "inadequate" to cope with the navy of Great Britain.[66] Only the German submarine had demonstrated the potential to operate effectively; the technology of the opponent was less capable of meeting that particular challenge. The point was dramatically underlined in May of 1916 when a numerically superior British force faced a highly efficient German battle fleet at Jutland and fought to a draw.[67] The technological development of the two fleets relative to each other was so close that neither side had an advantage. If the balance were tipped in either direction, it would be weighted by other factors.

As naval officers dealt with the problem of coordinating technologies and bringing them into a complementary balance, they discovered that technology had intruded into the very execution of command. Communication by electromagnetic means threatened the efficiency of the command structure. In a letter to McCarty Little, W.L. Rodgers

noted that "the modern improvements in communications, typewriter, telegraph, telephones and radio all tend to centralization. We cannot dispense with any of them and yet . . . both responsibility and unity of control and plan tend to disappear."[68] Rodgers went on to note that the Secretary of the Navy *thinks* he is in control since he is continually signing orders, but real control remained in the hands of an unknown clerk or junior officer who prepared the correspondence. With the delegation of this function to unrelated subordinates, each dealing with his own specialty, there appeared a loss of overall planning and a disorganized product. "No one is in charge of putting a given task through as a whole; and so we have the familiar order, counter order, disorder."[69] Rodgers was not alone in detecting the dangers of centralization and the detrimental aspects of long-range communication. Secretary of the Navy Daniels himself noted that

> . . . on one proposal there is another gesture about a system of communications which is capable of such large expension, and that is that the temptation will be ever present to rely on such a system for momentary communication of orders instead of the development of doctrine and the reduction of the need for any system to a minimum.[70]

There were times, of course, when direct communication was useful and effective. Admiral Dewey remarked that "there is a psychological effect of direct personal communication between responsible officers which it is desirable to have the facilities for carrying out in terms of great emergency."[71] Few observers recognized the paradox of rapid, long-distance communication weakening the command structure. The novelty and advantages of direct communication with the Navy Department and high-level commanders overshadowed a serious threat to efficiency. The vision of concentrating all decisionmaking power in a single person or office foreshadowed a faltering, inefficient executive and an uncontrollable bureaucracy. The unregulated centralization of command would withhold initiative from subordinates, thus denying the full exercise of judgment, expertise, foresight, and response in every echelon. Although not designed specifically to handle the problem of modern communications, the concept of the "order form" could be easily adapted to maintain a decentralized organization and still take advantage of the rapid exchange of information.

In 1914 an incident occurred in Mexico which illustrated another aspect of the problem in command relations. On 9 April at Tampico, a whaleboat with an officer and eight sailors was sent ashore from the U.S.S. *Dolphin* to purchase gasoline for Rear Adm. Henry T. Mayo's barge. While at the wharf, local guardsmen seized the uniformed men who had landed in the revolution torn city. When the local military commander learned of the arrest of American sailors, he immediately released them and sent a personal apology to the admiral on board *Dolphin.* Admiral Mayo, however, considered that the seizure of men from a boat flying the American flag was a hostile act and not to be excused. He demanded that a formal apology be issued, that the officer responsible for the seizure be punished, and that the American flag be raised prominently and saluted with 21 guns. In addition, the Mexicans' reply was to be received and the salute fired within 24 hours. In Washington, President Wilson seized upon the admiral's ultimatum as an affair of national honor. The failure of the Mexicans to comply led Wilson to ask Congress for authority to use armed force against the Mexican forces under General Huerta. A minor incident had become a *casus belli;*[72] President Wilson and his Cabinet completely supported Admiral

Mayo's initiative. Although there was no question of improper conduct on Mayo's part, such incidents could set a precedent detrimental to the control of the Navy. It was a question of at what level a particular type of decision should be made. Mayo had assumed responsibility for an area of policymaking that rightly lay at the highest level of government. With this in mind, Daniels changed article 1648 of Naval Regulations on 15 September 1916 to read:

> Due to the ease with which the Navy Department can be communicated with from all parts of the world, no commander, or commanding officer, shall issue an ultimatum to the representatives of any foreign government, or demand the performance of any service from any such representative that must be executed within a limited time, without first communicating with the Navy Department, except in extreme cases where such action is necessary to save life.[73]

On one side existed the dangers of overcentralization, and on the other ineffectiveness resulting from fragmented control. "From all this we are rescued," wrote W.L. Rodgers, "if we appreciate the methods of problem solving, estimate of the situation and order writing."[74] In other words, to avoid the extremes which the new communications technology thrust upon the Navy, it was necessary to understand the kinds of decisions which should be made at each level of command and to issue orders and commands on that basis. For the system to be effective, each level of command must display both an obedience to the direction it received and, at the same time, be able to perform with initiative within its own realm of responsibility. Good organization required a clear apprehension of a subordinate's area of discretion and the superior's sphere of action. As William McCarty Little put it,

> the expert is probably superior to the employer in ability to exercise the expert's art; but the employer does not feel in any way humiliated by employing him to exercise his skill . . . therefore there should be no squeamishness in giving to a subordinate all the latitude in execution which his capacity and the requirements of the problem permit.[75]

What had arisen from technology could thus be controlled through human leadership and discretion. It was a problem of men, not of machines.

In 1912 Professor Hugo Munsterberg lambasted "the world of newspaper readers" who were hypnotized by the naval machinery of the day. He told the students of the Naval War College,

> . . . in the midst of this unquestioning enthusiasm for the material development and the physical progress of the battleship, you stand for the conviction that it is after all the man, man's thought, and man's emotion, and man's will which is of decisive importance. You do not submit to the popular prejudice which expects success only from the marvels of steel and power and electricity. You have learned too well the great lesson of history which demonstrates that throughout four thousand years the victory has been with the ships who were fit to win. It is not true that fate has been with heavy guns; it has been with the great minds. The knowledge of the ships and the armament becomes a living power only if it is embedded in the understanding of strategies and grand tactics, and they would be empty if the psyche of man were not acknowledged as their centre.[76]

Recognizing that even in a highly technological era it is human understanding that links together all the

elements of a navy, professionals went further to ask what kind of individual man was required for this work. They dealt with the issues of proper training and the type of knowledge naval men should have. Characteristically Bradley Fiske wrote,

> . . . he who sails the sea and braves its tempests, must be in heart and character a sailor—and yet he who fights the scientific war-craft of the present day cannot be merely a sailor like him of the olden kind, but must be what the *New York Times*, a few years ago, laughingly declared to be a combination quite unthinkable, "a scientific person and a sailor."[77]

W.B. Norris, an instructor at the U.S. Naval Academy, explored Fiske's argument. In his mind a naval leader should know more than just drills, parades, and cruises. He should be master of his calling. He should be at home with seamanship, electricity, engineering, and ordnance; most importantly, "he should be able to put into operation and practical use all the principles of these subjects. In him the mastery of the sea which we associate with the old time seaman is joined with a professional attainment and a scientific attitude of mind that have hitherto flourished only ashore."[78] While the naval officer may not be able to perform every task done on board ship, he should have a practical acquaintance with everything and understand its relation to the efficiency of the fleet. Such a goal was difficult to achieve because the entire atmosphere of shipboard life was permeated by mechanism. "Life on ship board is almost like spending one's days and nights in an iron foundry," Norris admitted. The constant and overpowering presence of machinery tended to harden the mind, he felt, and give everything a mechanical turn. In that kind of environment the concept of men acting as if they were machines grew stronger. "Personality then drops into the background and the necessity of man's being a source of inspiration to those he commands is forgotten."[79] Admittedly, the knowledge of enginerooms and guns was important to the Navy. Admiral Luce proclaimed, " . . . that every naval officer must be something of a marine engineer; and the better the engineer he is the better for the Navy. The point is: Why should his education stop there?"[80]

In a highly technical society it seems natural that there would be a tendency for specialization among individuals. The General Board and other officers in the Navy continually rejected recommendations for further specialization. In 1909 the Board reported that it was evident that the Navy would continue to need a large number of officers who were thoroughly trained and highly specialized in engineering to perform the duties of inspection, and design. However,

> . . . the operation and care of machinery is a different duty from its design and construction, and the first may be very successfully performed by men not qualified for the latter . . . the advantage of having all the duties involving the management and control of the ships and her preparation for efficiency in battle performed by one body of officers is so great . . . it should be regarded as fundamental and should not be changed.[81]

The General Board strongly believed that the determination of naval policy, fleet composition, and the strategic and tactical qualities of ships should always lie in the hands of the "military seagoing man." Control of the military features in warships could never be achieved if the seagoing man simply accepted what shore-based experts supplied him. Additionally, the Board strongly believed that shipboard engineer officers should not be specialists in the single field of engineering. The

advantage to discipline, military efficiency, and professional development was far greater if well-rounded officers of the line fulfilled this function. In the same way, a technical expert who should decide on the scope and character of repairs would take away a responsibility and duty from the commanding officer which the Board felt was "proper and necessary to the most efficient exercise of his functions."[82]

Training was the key problem. Wars are relatively rare situations; a man cannot learn about warfare on a day-to-day basis as he might learn about steam engines or seamanship. One cannot comprehend one subject by concentrating on another. As one officer remarked, "no one ever learned to handle an oar by swinging dumbells."[83] The art and science of naval warfare can be learned only through continuous training operations at sea. Fleet maneuvers and ship tactics are essential to this goal, and they can be augmented by war gaming. Employing "the applicatory system," students learned from actual practice the principles of their art that could not be gleaned from a textbook. On the game boards at the Naval War College, model ships moved over measured areas at a rate compatible with existing equipment. American ships were opposed by forces whose guns and capabilities conformed to the latest intelligence, thus testing American forces and strategies in a simulated crucible of war. When mock battles were played in this manner, the results were not always happy. In 1903 one group of officers reported that,

> . . . the game has been played to solve the problem of what should be the proper tactics to be followed by our fleet in order to get the best results against the fleet of the enemy in the problem of the year. The game has been played as if making use of the means at hand. The result has been that we lose. In one game we tied and in every other we lost.[85]

Since the innovation of the naval war game it had evolved from a desk top study to a massive, room-size game board. A journalist of the early 1920's graphically described a game similar to those played just before World War I:

> Away up on this corner of the board far out of range of observers of the opposing fleet something is going on. The theoretical distance is so great that a screen is set up on the board to conceal just what is being done. Something is maneuvering behind the screen. The enemy is attracted, then puzzled, then disturbed . . . All over the board little dramas are being built up within the main engagement. It would be so in an engagement at sea. A staff officer seeks out his commander-in-chief and talks earnestly to him as they look down upon the little ships . . . The commander-in-chief nods and nods and smokes his pipe while the lines deepen in his face. Across the board the opposing commander-in-chief sits astride a high stool leaning forward, his hands clasped before him as he studies the situation . . . From time to time the umpire calls for signals and communications. Papers travel to rooms outside the game room where computations and calculations accompany the progress of the battle. Ships are crippled and lines are turned. Torpedoes depended on to do damage have been fired at too great range and have struck only after broaching, with a resultant diminution of damage. Superiority in one kind of craft has been nullified by superiority in another kind . . . Every effort is made to keep the game on the plane of realism . . . Information that could not be had in battle is not permitted to bear on the game board.

> The time element is always kept in mind. The speed of real ships is never forgotten in the estimate of results.[85]

By such work not only were methods improved, but students acquired skill in their profession by solving the kind of strategic and tactical problems that the use of their equipment involved. Politics, geography, and weather; logistics, engineering, and ordnance; command and control, planning, and decision-making all joined on the game board to simulate actual situations. As McCarty Little expressed it, "the game offers the players the whole world as a theatre, and puts no limit to the forces either in numbers or kinds, any type of ship may be had for the asking, the only requirement being to state its qualities so they may be expressed in game convention."[86] The common purpose of war gaming and fleet maneuvers was to make the object so closely associated with the method that one suggested the other. Art in naval warfare had to become instinctive, through continuous practice and repetition.[87] The most perceptive students understood that when war did come, military and naval officers must rapidly respond to unknown forces. In the final analysis, they would have only intuition to fall back upon.

The brief span of years between the Spanish American War and the American entry into World War I witnessed rapid changes in naval technology. Instead of engulfing professional naval men in the chaos between innovation and obsolescence, naval strategists and their articulate seagoing associates concentrated their efforts on developing the means by which man could logically control and direct this expanding technology for the purposes which they devised. Situations were avoided in which technology became its own object. Awakened by the teachings of Luce, Mahan, and the naval reformers of the late 19th century, the professional men of the early 20th century were able to devise administrative structures, methods of operation, training procedures, and doctrine which contributed to a broadly based direction of naval power. The naval professional learned that a balance must be struck between the goals and principles of warfare and the realities, limitations, and characteristics of available technology. Neither the professional of the day nor the historian of the era can deny that the understanding of naval power derives from a clear vision of its vast scope, for it takes into account international politics, war principles, technology, strategy and tactics, and the national wealth and will, all at the same moment. The professional understanding which developed in the first decade and a half of the new century provided the background for naval operations in both World War I and World War II. It was in these years that naval men learned to control the new technological environment which they, themselves, had created.

BIOGRAPHIC SUMMARY

Lt. John B. Hattendorf, U.S. Navy, was awarded his bachelor's degree from Kenyon College (1964) and his master's degree from Brown University (1971). He attended the Munson Institute of American Maritime History at Mystic, Conn., in 1970. Lieutenant Hattendorf has served in Atlantic and Pacific Fleet destroyers, the Naval History Division of OPNAV, and the Naval Historical Collection at the Naval War College. While assigned to the Naval History Division he contributed to the *Dictionary of American Naval Fighting Ships* and *Naval Documents of the American Revolution. The American Neptune* has just published his article on the British naval historian Sir Julian Corbett. Lieutenant Hattendorf is currently assigned, under instruction, to the Naval Destroyer School, Newport, R.I.

FOOTNOTES

1. A.W. Dunbar, "The Medical Department in Warfare," Typescript in Naval War College Lecture Collection, Naval Historical Collection, U.S. Naval War College, Newport, R.I., p. 1. (Henceforth abbreviated: NWC Lectures, NHC.)

2. A study of the contributions of these men may be found in Donald M. Schurman, *The Education of a Navy* (Chicago: University of Chicago, 1965).

3. R.H. Spector, "Professors of War," Unpublished Ph.D. Dissertation, Yale University, New Haven, Conn.: 1967, p. 159.

4. Alfred T. Mahan, *The Influence of Sea Power upon History 1660-1783* (London: University Paperbacks, 1967), p. 7.

5. *Ibid.*, p. 8-23.

6. Alfred T. Mahan, "Lectures on Military Strategy," Unpublished manuscript and typescript in NWC Lectures, NHC, p. 11, 77. Believed to have been originally written about 1889, these lectures were often repeated and later used as assigned reading at the Naval War College in the first decade of the 20th century.

7. William McCarty Little, quoted in Frank Schofield, "Estimate of the Situation," Lecture before the Summer Conference, June 1912, *Solution to the Problem 1912*, Naval War College Archives, NHC, pt. II, p. 29-30.

8. William McCarty Little, "The Strategic Naval War Game or Chart Maneuver," Lecture, U.S. Naval War College, Newport, R.I., 10 June 1911.

9. This brief review is based on an excellent summary of the beginning of U.S. naval war planning which may be found in D.J. Costello, "Planning for War: a History of the General Board of the U.S. Navy, 1900-1914," Unpublished Ph.D. dissertation, Fletcher School of Law and Diplomacy, Medford, Mass.: 1968, p. 1-22.

10. Luce to Mahan, 15 July 1907; original carbon typescript copy in War College Archives, Ms. #184, NHC. Italics are Luce's.

11. William R. Braisted, *The United States Navy in the Pacific 1897-1909* (Austin: University of Texas Press, 1956), p. 21-22. The original plan may be found in the National Archives, RG 42, Records of the North Atlantic Station. A photocopy has been included in War Plans files, Records of the General Board, Naval History Division, Washington, D.C.

12. Kenneth Bourne and Carl Boyd, "Captain Mahan's 'War' with Great Britain," *United States Naval Institute Proceedings*, July 1968, p. 71-78. Also, John A.S. Grenville and George B. Young, *Politics, Strategy, and American Diplomacy: Studies in Foreign Policy* (New Haven: Yale University Press, 1966), p. 93, 171-72; Walter R. Herrick, Jr., *The American Naval Revolution* (Baton Rouge: Louisiana State University Press, 1966), p. 78, 126, and 140.

13. Navy Department General Order 544, 13 March 1900, quoted in Costello, p. 25.

14. Long to Dewey, 30 March 1900, quoted in Costello, p. 25-26.

15. Costello, p. 2-3.

16. Damon E. Cummings, *Admiral Richard Wainwright and the United States Fleet* (Washington: U.S. Govt. Print. Off., 1962), p. 213-217; Mark A. deWolfe Howe, *George von Lengerke Meyer, His Life and Public Services* (New York: Dodd, Mead, 1920), p. 466-69; Henry P. Beers, "Development of the Office of the Chief of Naval Operations," *Military Affairs*, Spring 1946, pt. II, p. 60-64.

17. For an outline history of naval war gaming see Francis J. McHugh, *Fundamentals of War Gaming*, 3d ed. (Newport, R.I.: 1966); Spector, ch. VI.

18. George P. Ahern, *A Chronicle of the Army War College 1899-1919*, processed Washington, D.C., 24 July 1919, #21 of 32 copies, NHC, NWC, p. 81-82; W.P. Cronan, "The Greatest Need of the United States Navy: Proper Organization for the Successful Conduct of War, An Estimate of the Situation," *United States Naval Institute Proceedings*, July-August 1916, p. 1153.

19. Charles W. Cullen, "From Kriegsacademie to the Naval War College: the Military Planning Process," *Naval War College Review*, January 1970, p. 10-15.

20. Cullen, p. 11. Quote from George F.R. Henderson, *The Science of War* (London: Longmans, Green, 1905), p. 5.

21. Cullen, p. 14-15.

22. J.H. Russell, "A Fragment of Naval War College History," *United States Naval Institute Proceedings*, August 1932, p. 1164-65.

23. Cronan, p. 1153.

24. Louis Morton, "War Plan *Orange*, Evolution of a Strategy," *World Politics*, January 1959, p. 227.

25. Bradley A. Fiske, *The Navy as a Fighting Machine* (New York: Scribners, 1916), p. 406.

26. *Ibid.*, p. 193.

27. *Ibid.*, p. 228.

28. William McCarty Little, "Philosophy of the Order Form," Lecture, U.S. Naval War College, Newport, R.I.: 12-13 August 1913, NWC Lecture, NHC, p. 14.

29. Dudley W. Knox, "The Role of Doctrine in Naval Warfare," *United States Naval Institute Proceedings*, March-April 1915, p. 354.

30. W.R. Shoemaker, "Strategy of the Pacific an Exposition of the Orange War Plan," Lecture, U.S. Naval War College, Newport, R.I.: 23 August 1914, NWC Lecture, NHC.

31. Typescript "Notes and Comments on G.B. Plan Blue vs. Black," undated, signed "MeK." laid in Black Plan War Portfolio No. 1, Reference No. 5-4, Germany War Plan, Copy No. 1 General Board copy. Records of the General Board, Naval History Division, Washington, D.C. This writer believes "MeK." to be Capt. Josiah Slutts McKean, USN. A Naval War College graduate and former staff member, McKean served as Assistant for Material in the Office of CNO from 1915 to 1919. He remained on duty in the Navy Department for several years. During World War I he was promoted to rear admiral and, later, admiral. As Assistant CNO he served as the Acting Chief of Naval Operations when Admiral Benson was naval adviser to the U.S. delegation at Versailles, 5 January to 20 June 1919 and from 5 September to 1 November 1919, between the retirement of Admiral Benson and the appointment of Adm. R.E. Coontz as CNO.

32. Carl T. Vogelgesang, "Estimate of the Situation," Report of the Conference 1911, pt. II, p. 2, NWC Archives, NHC.

33. *Orange Plan*, p. 7, War Plans File, Records of the General Board, Naval History Division, Washington, D.C. (Henceforth abbreviated: GB Records, NHD.)

34. See for example, A.T. Mahan to W.L. Rodgers, 17 May 1910 quoted in Spector, p. 250.

35. Mahan, "Lectures on Military Strategy," p. 42-43.

36. *Ibid.*, p. 8.

37. Fiske, p. 129.

38. Richard Hough, *Dreadnought* (New York: Macmillan, 1964), p. 15-23.

39. Elmer B. Porter and Chester W. Nimitz, eds., *Sea Power: a Naval History* (Englewood Cliffs, N.J.: Prentice-Hall, 1960), p. 388-392.

40. Wilbur R. Van Auken, *Notes on a Half Century of United States Naval Ordnance* (Washington, D.C.: Banta, 1939), p. 13-24.

41. Linwood S. Howeth, *History of Communications–Electronics in the United States Navy* (Washington: U.S. Govt. Print. Off., 1963), p. 518-527.

42. Costello, p. 26-27.

43. George Dewey to Secretary of the Navy, 27 May 1904, General Board Letters, v. III, p. 0154, GB Records, NHD.

44. See Dewey to SecNav, 30 September 1902, General Board Letters, v. II, p. 0089-90; and General Board Letters, v. V, p. 0089-91 on coaling and colliers, GB Records, NHD.

45. Dewey to SecNav, 3 September 1906, General Board Letters, v. IV, p. 324; GB Records, NHD; and Report of the Summer Conference 1912, pt. II, p. 131, NWC Archives, NHC.

46. George Dewey to SecNav, 16 June 1909, General Board Letters, v. VI, p. 0093, GB Records, NHD.

47. R.D. Gatewood, "The Industrial in Modern War," *United States Naval Institute Proceedings*, May-June 1916, p. 757.

48. Orange Plan, Strategic Section, 25 February 1914, p. 1, GB Records, NHD. This statement is also in W.R. Shoemaker, "Strategy of the Pacific, an Exposition of the Orange War Plan," Lecture, U.S. Naval War College, Newport, R.I.: 23 August 1914, NWC Lectures, NHC.

49. C.T. Vogelgesang, "Logistics–Its Bearing upon the Art of War," Lecture before the Summer Conference of 1911, NWC Lectures, NHC, p. 6, 8.

50. Carl T. Vogelgesang, quoted in J.S. McKean, *Naval Logistics: a Lecture Delivered . . . at the Naval War College Extension, Washington, D.C., 10 March 1913* (Washington: U.S. Govt. Print. Off., 1915), p. 7.

51. Gatewood, p. 757-59.

52. Fiske, p. 278.

53. Black Plan, p. 57-58, 65, GB Records, NHD.

54. *Ibid.*, p. 58, para. 111.

55. T.J. Cowie, "Logistics," Lecture, U.S. Naval War College, Newport, R.I.: 13 May 1915, NWC Lectures, NHC, p. 20.

56. Dewey to SecNav, 28 September 1910, General Board Letters, v. VII, p. 0058, GB Records, NHD. Earlier letters on the same topic contain similar reasoning; see Dewey to SecNav, 9 February 1903, General Board Letters, v. II, p. 0177 and 26 January 1904, v. III, p. 0006.

57. Quoted in A.J. Marder, *The Anatomy of British Sea Power* (New York: Knopf, 1940), p. 525.

58. Dewey to SecNav, 28 February 1903, General Board Letters, v. II, p. 0210, GB Records, NHD.

59. Dewey to SecNav, 16 May 1903, General Board Letters, v. II, p. 0261, GB Records, NHD.

60. "Report of the Board to Consider CDR A.L. Key's Comments on the Design of the Battleship *North Dakota*, July 1908," Report of Committee B, p. 4, and Report of Committee Z. NWC Archives, NHC. This controversy is discussed at length in Elting E. Morison, *Admiral Sims and the Modern American Navy* (Boston: Houghton, Mifflin, 1942), p. 201-215.

61. Key Board, "Appendix H. Paper Read by Admiral Goodrich."

62. Bradley A. Fiske, "The Naval Profession," *United States Naval Institute Proceedings*, June 1907, p. 570-73; Bradley A. Fiske, *Midshipman to Rear Admiral* (New York: Century, 1919), p. 397-39; and Sir Percy Scott, *Fifty Years in the Royal Navy* (New York: Doran, 1919).

63. Fiske, *Midshipman to Rear Admiral*, p. 580, 591-592. Fiske gives the impression in his autobiography that the Naval Consulting Board was seriously considered only after the newspaper announcement on 5 July 1915 that Sir John Fisher had been appointed head of a similar board in the Royal Navy. There is evidence in E. David Cronon, ed., *The Cabinet Diaries of Josephus Daniels 1913-1921* (Lincoln: University of Nebraska Press, 1963), p. 102, that the 7 July 1915 letter to Edison was being drafted as early as 30 June 1915; see also Josephus Daniels, *The Wilson Era* (Chapel Hill: University of North Carolina Press, 1944), chap. 52, p. 490-500. *The New York Times* interview with Edison which inspired Daniels to enlist the inventor's support appeared on 30 May 1915, pt. V, "Magazine Section," p. 6-7, not in "early July" as stated by Daniels in his autobiography.

64. Daniels to Edison, 7 July 1915, quoted in Lloyd N. Scott, *Naval Consulting Board of the United States* (Washington: U.S. Govt. Print. Off.; 1920), p. 286-287.

65. Fiske, *Fighting Machine*, p. 63-64.

66. "Confidential Memorandum Adopted by the Executive Committee, 6 Aug 1915," General Board Study 420-2, 30 July 1915, GB Records, NHD.

67. See H.H. Frost, *The Battle of Jutland* (Annapolis: U.S. Naval Institute, 1936), p. 505-518, for an evaluation of the battle.

68. William L. Rodgers to W. McCarty Little, 10 May 1914, p. 3-4, Manuscript letter in NWC Archives, Research file, "Little," NHC.

69. *Ibid.*

70. Josephus Daniels, SecNav, to W.H. Bullard, Superintendent, Naval Radio Service, 3 March 1916; Letter (Second Endorsement) from Superintendent Radio Service, 7 December 1915, GB Records, NHD.

71. Dewey to SecNav, Serial 467 of 19 January 1916, File 419, GB Records, NHD.

72. For a detailed account of the *Dolphin* incident, see Jack Sweetman, *The Landing at Vera Cruz: 1914* (Annapolis: U.S. Naval Institute, 1968), p. 30-40.

73. Josephus Daniels, *The Wilson Era*, p. 191. Daniels indicates that the 1916 order was delayed for more than 2 years so that it would not be construed as a rebuke to Admiral Mayo.

74. Rodgers to Little, 10 May 1914, p. 4.

75. William McCarty Little, "Philosophy of the Order Form," Lecture, U.S. Naval War College, Newport, R.I.: 1913.

76. Hugo Munsterberg, "The Psychology of the Navy," Lecture, U.S. Naval War College, Newport, R.I.: 4 June 1912, NWC Lectures, NHC, p. 2.

77. Fiske, *Fighting Machine*, p. 196-97.

78. W.B. Norris, "Leadership and Freedom," *United States Naval Institute Proceedings*, January-February 1916, p. 51.

79. *Ibid.*, p. 61.

80. Stephen B. Luce, "On the Relations between the U.S. Naval War College and Line Officers of the U.S. Navy," *United States Naval Institute Proceedings*, September 1911, p. 788.

81. Letter (Fourth Endorsement) on W.T. Culverhouse' letter, 15 February 1909. Comments on the condition of the commissioned personnel, 23 December 1908, General Board Letters, v. V, p. 0433, GB Records, NHD.

82. Dewey to SecNav, 28 January 1909, General Board Letters, v. V, p. 0404, GB Records, NHD.

83. H.G. Bergen, "The Principles of Training," Lecture, U.S. Naval War College, Newport, R.I.: 1909, NWC Lectures, NHC, p. 10.

84. "Solution to the Problem of 1903, Conclusions Deducted from the Use of the Game Board," p. 65, NWC Archives, NHC.

85. W.A. McDonald, "The Navy Fights a Battle in a Room," *Boston Evening Transcript*, 21 November 1923, pt. III, p. 3.

86. W. McCarty Little, "The Strategic Naval War Game."

87. W. McCarty Little, "Genesis of the Masterpiece of a Genius," Unpublished Typescript and notes for study of Napoleon's strategy, c. 1902, NWC Archives, Research File "Little," NHC.

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Although the Navy Department is in an important aspect an industrial establishment in which ships are built and repaired and armament and equipment manufactured, it must not be forgotten that the final purpose of its existence is military, and that all business which is transacted therein has for its end the creation and employment of effective power upon the sea.

Secretary of the Navy William Hunt Moody,
Annual Report, 1903, p. 4